

enable them to spend two years at a Central Technical School, in order to acquire the necessary knowledge of scientific principles and some acquaintance with methods of instruction. Whether the "intelligent workman" would afterwards be content to pass his days in the workshop, and his evenings in the class-room, is another story. But however this may be, the intentions of the Committee are good, and we should be sorry to say anything which would tend to depreciate the admirable efforts they are making to improve the condition of technical education in this country. Mr. G. Matthey, the Chairman of the Committee, and Sir Philip Magnus, the Superintendent of the examinations, deserve the thanks of every one interested in the development of our industries for their organisation of knowledge which lies at the root of such developments.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Dr. Glaisher, F.R.S., has been appointed Chairman of the Examiners for the Mathematical Tripos, Part II. of 1897. Mr. J. G. Leatham, fourth wrangler 1894 and Isaac Newton Student in Astronomy, has been elected to a fellowship at St. John's College; and Mr. W. E. Philip, third wrangler in the same year, to a fellowship at Clare College. Mr. W. E. Johnson, of King's College, has been appointed to the University Lectureship in Psychology, vacated by Mr. G. F. Stout, editor of *Mind*.

A COMMITTEE has been appointed to consider the mode in which the grants in aid to science and art schools are distributed, and to report if it is desirable to make any alteration therein. The members consist of the Vice-President of the Committee of Council on Education (Chairman); Mrs. Sidgwick, Sir John F. D. Donnelly, K.C.B., Secretary of the Science and Art Department; Sir H. Roscoe, F.R.S., Mr. G. L. Ryder, H.M. Treasury; Prof. R. C. Jebb, M.P., Mr. W. Armstrong, Director of the National Gallery, Dublin; Captain W. de W. Abney, C.B., F.R.S., Science and Art Department (Secretary).

It is announced in *Science* that the Chicago Institute of Education has appointed a committee of sixty to develop some feasible plan for carrying on systematic outdoor, or field work, in connection with nature study. The committee held its first meeting on September 19, and a permanent organisation was effected by the election of Mr. Wilbur S. Jackman as President, and Mrs. M. L. T. Baker as Secretary, and the appointment of a number of sub-committees. One of the first works of the committee will be the preparation of maps of the environs of Chicago, which will assist the pupils and teachers of the public schools in a systematic study of the country lying within a convenient radius of the city.

THE sum of £25,000 has now been subscribed for an engineering laboratory at Glasgow University (says *Engineering*), and the same tact and energy which have been displayed in finding the money, will result in an early realisation of the aim of the promoters. The sum of £12,500 was voted out of the Bellahouston Trust Estate, and the remainder has been readily subscribed by engineers and others in the district. Meanwhile a temporary laboratory is to be equipped, two large rooms having been set apart in the main building. This, however, will not even delay the arrangements for the new laboratory. A gas engine of ten horse-power is being presented to the University by the Committee of the Murdock Memorial Fund, and this will commemorate the association of the founder of gas-lighting with James Watt. The testing plant will include a ten-ton machine, with tension, compression, shearing, and bending tackle and an autographic stress-strain recorder, while a melting furnace will be constructed for making alloys.

ABUNDANT evidence of the continued increase in the number of well equipped and properly staffed technical schools throughout the country is afforded by the current number of the *Record of Technical and Secondary Education*, which is published quarterly under the auspices of the National Association for the Promotion of Technical and Secondary Education. A detailed review of the work accomplished in thirteen county boroughs is given; and selected as these are from all parts of the country, they afford an excellent means of judging of the general advance which has taken place since the passing of the Technical Instruction Act of 1890. The photographs of the various

departments of the Battersea Polytechnic, and the Victoria Institute, Worcester, show that the plan upon which these new places of instruction are furnished leaves very little to be desired. The editorial notes, with which the publication opens, emphasise the occurrences of special educational interest during the preceding three months, and, together with the article on intermediate education in Wales, they show that the Association has reason to be satisfied with the results of its efforts to improve the knowledge of the workers of this country. Reference is made in the *Record* to the Return recently presented to Parliament, showing that the total income of evening continuation schools in this country amounts to £189,130 3s. 1d., made up as follows:—Grants by the Education Department, £81,362 3s. 4d.; grants by the Science and Art Department, £1410 12s. 11d.; grants by County Councils, £16,440 11s. 2d.; School Board rates, £58,516 12s.; voluntary contributions, £7432 7s. 8d.; school fees and books, £22,303; endowment, £515 18s.; other sources, £1149 14s. 4d.

SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, October 30.—Captain Abney, President, in the chair.—Special general meeting.—The Secretary having read a summary of the replies sent by members to a circular which had been addressed to them during the last session, a series of resolutions drawn up by the Council, bearing on the points raised by this circular, were adopted. The chief of these resolutions were to the following effect: (1) That the subscription to the Society be raised to £2 2s. (2) That present life-members be invited to voluntarily subscribe £1 1s. annually to the funds of the Society, or to compound for this annual contribution. (3) That a guarantee fund be instituted. (4) That in future members of the Society be styled Fellows of the Physical Society of London. In the course of the discussion on these resolutions the President, Secretary, and Treasurer gave an account of the financial position of the Society, and explained that at present each member receives from the Society, in the shape of Proceedings and Abstracts, printed matter which costs the Society more than the amount of the annual subscription. The ordinary science meeting was then held.—A letter was read from Lord Kelvin thanking the Society for the address which the President, on their behalf, had recently presented to him.

—Prof. W. Stroud read a paper, by himself and Mr. J. B. Henderson, on a satisfactory method of measuring electrolytic conductivity by means of continuous currents. The method consists in placing a balancing electrolytic cell in the arm of the Wheatstone's Bridge adjacent to the arm containing the chief electrolytic cell, so that the electromotive force of polarisation in the two cells neutralise each other's effect on the galvanometer. The authors find that if the resistance of the arms of the bridge are high (20,000 ohms), and if an E.M.F. of about 30 volts is used in the battery circuit, then the resistance of a solution (of potassium chlorate in their experiments) can be determined to within about one part in two thousand. With a D'Arsonval galvanometer the balancing cell is so efficacious that it is impossible to tell that it is not a metallic resistance that is being measured. Prof. Perry asked if the authors had tested whether the difference in resistance of the two cells was proportional to the difference in length of the liquid columns. Mr. Appleyard said he had found that the resistance of an electrolyte appeared to vary, because in the ordinary arrangement the cell was short circuited through the arms of the bridge. He suggested as a remedy the making and breaking of the circuit by a special key so arranged that, except when taking a reading, the cell is on open circuit. Mr. Blakesley asked if the authors had tried the method in which the resistances are adjusted till, when the battery circuit is broken, there is no immediate change in the galvanometer deflection. It is possible by this method to measure a resistance of between 6000 and 10,000 ohms to within 0.1 per cent. Prof. Ayton said the method referred to by Mr. Blakesley was the ordinary "false zero" method. In using this method you were working to a continuously altering zero; in Prof. Stroud's method, however, the zero was constant. Mr. Appleyard said he had found the "false zero" method troublesome to use. Prof. Stroud, in reply, said they had not tested the proportionality between the resistance and length, and they had not tried the "false zero" method.—Mr. Appleyard then exhibited a number

of different forms of electrical Trevelyan rockers. The most interesting one consisted of two rods of carbon fixed to a wooden sounding-board, with a third carbon rod lying across the other two, so as to form a microphone. A fairly strong current is passed through his microphone and through two electromagnets, which act on the prongs of a tuning-fork fixed to the sounding-board. The tuning-fork acts on the microphone, which, by making and breaking the current, keeps the fork in vibration. A cylinder of carbon forming the "knife edge" of a small pendulum, supported on two horizontal carbon rods, kept the pendulum in violent oscillation as long as a current passed from one of the horizontal rods, through the movable cylinder and out through the other horizontal rod.

PARIS.

Academy of Sciences, October 26.—M. A. Cornu in the chair.—The President announced to the Academy the loss it had sustained by the death of M. Félix Tisserand, Member of the Astronomical Section, and gave a short account of his services to science.—Researches on arabinose, by MM. Berthelot and G. André. The study of the action upon arabinose of water, hydrochloric acid, and phosphoric acid under varying pressures. A continuation of the work already published on glucose, estimations of carbon dioxide, carbon monoxide, formic acid, humic acid, and furfural being carried out.—Explanation of a note entitled "Cryoscopy of precision," by M. F. M. Raoult. A verbal correction of a previous note.—Observations of the Brooks comet (1889 V.) made at the Observatory of Rio de Janeiro, by M. L. Cruls.—On some linear partial differential equations arising from the theory of surfaces, by M. P. Craig.—On the singularities of the equations of dynamics, by M. Paul Painlevé.—On the distributions of strains in metals subjected to stresses, by M. L. Hartmann. From the hypothesis here developed it is concluded that any solid possessing an elastic limit is necessarily non-isotropic.—On the property of discharging electrified bodies produced in gases by incandescent bodies and by electric sparks, by M. E. Branly. Some remarks on a communication by M. Villari.—On the protection afforded by the lightning conductor at the tower of St. Jacques, by MM. C. Mildé and E. Grenet.—On the periodic maxima of spectra, by M. Aymonnet.—Vapour pressure of a substance compressed by a gas which it dissolves; vapour pressure of a solution in general, by M. A. Ponsot. By considering such a mixture in osmotic equilibrium, a general expression is obtained, which includes the case where the gas is insoluble in the liquid, and the case of aqueous saline solutions.—Hexamethylene-amine and its nitroso-derivatives, by M. Marcel Delépine. Experiments on the heats of combustion and formation of hexamethylenamine, its nitrate, and two nitroso derivatives.—On the luciferase of animals and vegetables, by M. R. Dubois. The word "luciferase" is applied to the active agent in the production of light in animals and vegetables. The light does not appear to be the result of a combustion or slow oxidation, although the absorption of oxygen is necessary.—Remarks on the digestive organs and mode of nutrition of *Dermochelys coriacea*, by M. L. Vaillant. The digestive organs of this turtle are much more complex than those in allied species, and lead to the conclusion that digestion is carried out somewhat slowly, probably on vegetable substances.—On the discovery of a bed containing vegetable impressions in the old volcanic debris in the island of Phira (Santorin), by M. A. Lacroix. This fossiliferous layer is small, being but a few decimetres thick, and having an area of some square metres, but the imprints are remarkably well preserved. Amongst the plants identified are *Phoenix dactyliflora*, *Chamærops humilis*, *Pistacia lentiscus*, and *Olea europea*.

DIARY OF SOCIETIES.

THURSDAY, NOVEMBER 5.

CHEMICAL SOCIETY, at 8.—The Constitution of Nitrogen Iodide: Dr. F. D. Chattaway.—Note on the Solution and Diffusion of certain Metals in Mercury: Prof. Roberts-Austen, C.B., F.R.S.—Compounds of Metallic Hydroxides with Iodine: J. Rietz.—The Economical Preparation of Hydroxylamine Sulphate; The Reduction of Nitrosulphates; and Amidodisulphonic Acid: Dr. E. Divers, F.R.S., and Dr. T. Haga.—The Molecular Conductivity of Amidodisulphonic Acid: Joji Sakurai.—Physiological Action of Amidodisulphonic Acid: Dr. Oscar Loew.—Imidosulphonates Part II.: Dr. E. Divers, F.R.S., and Dr. T. Haga.—How Mercurous and Mercuric Salts change into each other: Seihachi Hada.—The Effect of Heat on Aqueous Solutions of Chrome Alum: Margaret D. Dougal.—

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The Saponification of Ethylic Dicarboxyl Glutaconate: Dr. H. W. Bolam.—The Periodic Law: R. M. Deeley.—The Colouring Matters occurring in British Plants: A. G. Perkin.—Carbohydrates of Cereal Straws: C. F. Cross, E. J. Bevan, and Claude Smith.

LINNEAN SOCIETY, at 8.—Mediterranean Bryozoa: A. W. Waters.—On some New Species of Crassula from South Africa: Dr. S. Schönland.—Holothurians of New Zealand: A. H. Dendy.

INSTITUTION OF MECHANICAL ENGINEERS, at 7.30.—Breakdowns of Stationary Steam-Engines: Michael Longridge.

FRIDAY, NOVEMBER 6.

GEOLOGISTS' ASSOCIATION, at 8.—Conversazione and Exhibition of Specimens.

TUESDAY, NOVEMBER 10.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—Opening Address: The President.—The Jackson-Harmsworth Expedition and the Story of the Last Year's Work: Arthur Montefiore Brice.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Tower Bridge: Superstructure: G. Cruickwell.—The Machinery of the Tower Bridge: Sam. G. Homfray.

ROYAL PHOTOGRAPHIC SOCIETY, at 8.—A New Form of Apparatus for Measuring the Light reflected from Prints: Chapman Jones.—A Theory of the Röntgen Phenomena: Charles E. Benham.

ANTHROPOLOGICAL INSTITUTE, at 8.30.

THURSDAY, NOVEMBER 12.

MATHEMATICAL SOCIETY, at 8.—The Combinatory Analysis: President's Address.—An Essay on the Geometrical Calculus, Part I.: Herr Lasker.—Symbolic Logic: H. MacColl.—On a General Integral with some Physical Applications: G. J. Hurst.—On Ratio: Prof. Hill, F.R.S.—On the Geometrical Construction of Models of Cubic Surfaces: W. H. Blythe.—Theory of Vortex Rings: H. S. Carslaw.—Differentiation of Spherical Harmonics: E. G. Gallop.—On the Application of Jacobi's Dynamical Method to the General Problem of Three Bodies: On certain Properties of the Mean Motions and the Secular Accelerations of the Principal Arguments used in the Lunar Theory: Prof. E. W. Brown.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Telephone Trunk Lines: John Gavey.

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY, at 8.—Notes and Observations on *Acidalia marginipunctata* and the Early Stages of the Second Brood of *Polyommatus argiolus*: R. Adkin.

FRIDAY, NOVEMBER 13.

PHYSICAL SOCIETY, at 5.—On Röntgen Rays: Prof. Threlfall and Mr. Pollock.—The Absorption of Electric Waves along Wires by a Terminal Bridge: Dr. Barton and Mr. Bryan.

ROYAL ASTRONOMICAL SOCIETY, at 8.

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